NUKEM Nuclear Technologies

Copper Cable Recycling Technology

Technology Need:

With the increase of Deactivation and Decommissioning (D&D) activities at nuclear facilities throughout the United States, hundreds of tons of contaminated copper wire are being sent to landfills or temporarily stored until dispositioning is complete. A need exists for reducing the waste volume associated with the disposal of contaminated copper wire.

Technology Description:

NUKEM Nuclear Technologies is the United States licensee of a copper wire recycling technology that will separate the copper from the contaminated insulation and dust. The recovered copper wire can then be recycled and reused, thus reducing the final landfill disposal volume and permitting the reuse of this natural resource. This technology is applicable to facility decommissioning projects at Department of Energy (DOE) nuclear facilities and commercial nuclear power plants undergoing decommissioning.

This technology was developed in Stuttgart, Germany, by RADOS. RADOS has used this technology in Europe to successfully recover many tons of contaminated wire for free release and reuse. The Copper Recycle system will process a wide variety of contaminated cables regardless of cable type or size. The cables are pre-sized, placed on a conveyor, and fed into a shredder where the cables are shredded into small pieces that can be more efficiently processed by the grinder.

Recycled Copper Wire

Copper Recycle Unit

During the grinding process, the copper is separated from the insulation. The processed cable is separated into a clean copper, slightly contaminated insulation and contaminated dust. Contaminated dust generated by the grinding process is filtered through several stages to prevent the release of airborne contamination. The Copper Recycling process is operated under a negative pressure from the time the wire enters the pre-shredder until it exits the separator. The exhaust air is filtered through a HEPA ventilation system.

Benefits:

<Recovery of a valuable resource

<Cost reduction in storage and disposal of contaminated wire

<Capable of processing many types and sizes of wire

<Achieved a 80% reduction in final waste volume (assuming insulation is used as "void filler" in other boxes)

<Cost recovery from the sale/re-use of the recovered clean copper

Status and Accomplishments:

The NUKEM Copper Recycling Technology was demonstrated in November, 1999, as part of the INEEL D&D Large Scale Demonstration and Deployment Project (LSDDP) funded by the DOE's National Energy Technology Laboratory (NETL). This demonstration took place at the Bonneville County Technology Center in Idaho Falls, Idaho.

Approximately 13.5 tons of non-radioactively contaminated copper wire was recycled for this demonstration. Nearly one-half of the wire was treated with a surrogate contaminant to demonstrate the effectiveness of removing or separating contaminated insulation from the non-contaminated copper wire. Different types of surrogate contamination were used to simulate loose as well as fixed contamination, thus allowing analysis and determination of the technology's effectiveness.

Various sizes and types of wires were selected for the demonstration to show the versatility of the system and to demonstrate its overall throughput with varying wire sizes. During the demonstration wire sizes ranging from telephone wire to large multi-conductor cable were processed. The large cable included high voltage, single-conductor cable with conductor sizes up to 0.75 inches. Large multi-conductor power cables were also processed with individual conductor sizes up to 0.50 inches and having an overall cable diameter of 2.5 inches. Samples of the copper, insulation and dust granules were collected and analyzed during the demonstration to determine the operational effectiveness as well as the cost effectiveness of this technology.

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Online Resources

Office of Science and Technology, Technology Management System (TMS), Tech ID # 2958
http://ost.em.doe.gov/tms

The National Energy Technology Laboratory Internet address is **http://www.netl.doe.gov**

For more information on NUKEM Nuclear Technologies, please visit their Internet address at **http://www.nukem.com/opp/**

An Innovative Technology Summary Report (ITSR) for this innovative technology can be found at **http://apps.em.doe.gov/ost/pubs/itsrs/itsr2958.pdf**